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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the liquid circulation system for keypunches used for the keypunch which punches concrete, a rock, etc.

[0002]

[Description of the Prior Art] A keypunch has a bit driving means for making the concrete which is a punched object, a rock, etc. rotate the bit which performs cut punching, and this bit, rotates a bit by the bit driving means, and punches by making it move to shaft orientations. Conventionally, this punching activity is done, usually supplying water (it considering as "cooling water" hereafter) to the liquid feed holes prepared in the bit as coolant. Such cooling water carries out the lubrication of the revolution of a bit, and it not only cools the frictional heat produced between ***** of a bit and the punched objects which rotate at high speed, but brings about the effectiveness of decreasing consumption of ***** of the bit by friction. Furthermore, cooling water also has the effectiveness which discharges the cut waste of the large quantity produced by cut punching by the keypunch.

[0003] The cooling water which has such effectiveness is usually supplied from the water works of a work site, and by the time a punching activity is completed, quite many amounts will be needed. On the other hand depending on the work site which does a punching activity, water works may not be ready. Since cooling water is required even in case a punching activity is done in such a site, the operator prepares beforehand the water used as cooling water for containers, such as a bucket and a pail can. It is almost the case to be restricted to necessary minimum for the condition of a work site, reasons of haulage, etc. about the water prepared at this time.

[0004] Thus, when doing a punching activity using the cooling water of the limited amount, in order to have to make the hole of many in the limited amount of water, the circulating water flow which can be inevitably used for each hole will be restricted extremely. In many cases, it is working with the last-minute circulating water flow which can work.

[0005]

[Problem(s) to be Solved by the Invention] However, when punching with the last-minute circulating water flow which can work, the sharpness of ***** of a bit may worsen. For this reason, working hours will be prolonged and effect will arise in the working stroke of the future. Moreover, since this cooling water is throwing away, in almost all cases, it will run short by the necessary minimum amount of water prepared beforehand. When cooling water runs short, it must go to supply to a location with the water works left distantly from a work site. Thus, in order to have to interrupt a punching activity while supplying cooling water, working efficiency will fall.

[0006] Moreover, when work sites are heights, such as a building, an operator's physical strength is remarkably exhausted with last thing, and the time amount which supplies water is also accompanied also by risk in order to have to carry the supplied water which is a heavy lift moreover. Moreover, blowdown of the cut waste produced during a punching activity is also urged to cooling water, and the cooling water discharged serves as suspension containing cut waste. For this reason, the punching

activity is done also for landscaping maintenance of a work site, collecting these suspension in another container, and this recovery is very troublesome.

[0007] Then, even if this invention is the case where only the little coolant can be prepared, it makes it a technical problem to offer the liquid circulation system for keypunches which can mitigate an operator's burden accompanying makeup of the coolant as inconvenience cannot appear in a punching activity, and can also perform recovery of suspension.

[0008]

[Means for Solving the Problem] The bit driving means which this invention makes rotate a bit and said bit in order to solve these technical problems, It uses for the keypunch which performs cut punching to a punched object by rotating said bit, equipping said bit with the liquid feed holes which supply the coolant, and supplying the coolant to said bit. A suspension recovery means to collect the suspension which cut waste mixed in said coolant by cut punching, and by filtering said cut waste contained in said suspension The liquid circulation system for keypunches characterized by having the suspension filtration means which makes this the coolant again, and a coolant supply means to supply the coolant obtained with said suspension filtration means to said bit is offered. Here, the coolant is a liquid supplied to a bit for the object, such as cooling of a bit, and it contains [only the cut waste of a minute amount is not included or] cut waste etc. very much. Moreover, suspension is coolant which the cut waste by cut punching mixed, and if it remains as it is, it is not suitable for supplying a bit as coolant.

[0009] Moreover, after said suspension filtration means filters said cut waste in said suspension by passing a filter, It is what is stored in a depot by making this into the coolant. Said coolant supply means It is desirable that it is what it is installed in said depot, and said pump is formed in the condition of having floated on the oil level of said coolant in said depot, including the pump which supplies said stored coolant to said bit, and supplies water to said bit in the coolant near said oil level.

[0010] That is, since it has a means to supply as coolant after supplying this invention to a bit, collecting the suspension containing cut waste and filtering it, the coolant can be circulated through and used for it and it can do a punching activity by the little coolant.

[0011] Furthermore, it is more desirable to include the abrasive grain mixing means which said coolant supply means mixes in the coolant after filtering the abrasive grain for grinding the edge of a blade of said bit.

[0012] Thus, it is possible to recover sharpness, even when the sharpness of the edge of a blade of a bit has worsened by mixing an abrasive grain in the coolant.

[0013] Moreover, said vacuum pump was considered as the configuration which makes the inside of said depot negative pressure from atmospheric pressure including the vacuum pump used in order that said suspension recovery means of the liquid circulation system for keypunches may collect suspension from the water receptacle putt prepared so that a punching point might be surrounded through exhaust passage. Thus, it becomes possible to collect stable suspension with constituting.

[0014] and at the end of the exhaust passage which collects suspension with said suspension recovery means, the liquid circulation system for keypunches It has a suspension distribution fixture and has the tubed body section which said suspension distribution fixture formed in the shape of a cylinder like object with base, and the tee prepared in the location of fixed height in the shape of a branch from the bottom part of this tubed body section. Said tee While being formed in the shape of a cylinder like object with base, said suspension was considered as the configuration in which opening for flowing out is formed. Thus, suspension can make it distribute uniformly in a filter with constituting.

[0015]

[Embodiment of the Invention] It explains by making to do a cut punching activity for one gestalt of operation of the liquid circulation system for keypunches concerning this invention on the wall surface of concrete hereafter using cooling water into an example, referring to drawing suitably. In addition, the liquid circulation system for keypunches concerning this invention is not limited to what is explained with the gestalt of this operation.

[0016] As shown in drawing 1 and drawing 2, by bit 2a which rotated by the motor which is a bit driving means, the liquid circulation system 1 for keypunches concerning this operation gestalt can be

used for the keypunch 2 which carries out cut punching to the wall W which is a punched object, and the cooling water supplied to bit 2a can be circulated through and used for it in the case of cut punching.

[0017] This liquid circulation system 1 for keypunches collects suspension, and has a suspension recovery means to supply water to the after-mentioned suspension filtration means through exhaust passage (hose 9), a suspension filtration means to remove the cut waste S in suspension, and a coolant supply means to supply the cooling water obtained with the suspension filtration means to bit 2a through a supply way (transparence hose 8). Furthermore, the coolant supply means is equipped with the abrasive grain feeder 7 which is an abrasive grain mixing means to mix the abrasive grain which grinds ***** 14 (refer to drawing 3) of bit 2a in the middle of the supply way. Here, suspension is cooling water containing the cut waste S produced by cut punching.

[0018] This liquid circulation system 1 for keypunches collects suspension by the water receptacle putt 3 first prepared so that a punching point might be surrounded as a suspension recovery means, and supplies water to a suspension filtration means through a hose 9. Next, it filters with the filter 18 which suspension was made to flow with a hose 9 and was prepared in filtration tank 4b in filtration tank 4b which is a part of suspension filtration means, and the cooling water which removed and obtained cut waste S is made to store in depot 4a. Here, a suspension filtration means consists of filtration tank 4b which filters suspension, and depot 4a which once stores the cooling water after filtration.

[0019] Furthermore, the stored cooling water is supplied to bit 2a through a supply way (transparence hose 8) by the submersible pump 5 which is a part of coolant supply means installed in depot 4a. It is the configuration that the abrasive grain of the specified quantity is supplied in the transparence hose 8 by the abrasive grain feeder 7 with which the coolant supply means was equipped at this time.

[0020] With the gestalt of this operation, as shown in drawing 3, it has bit 2a, the first motor 2b which is the actuator which does revolution actuation of the bit 2a at the circumference of a shaft, and the second motor (not shown) for moving bit 2a to shaft orientations, and the keypunch 2 with which both motors are controlled by the control section (not shown) prepared outside was used.

[0021] This bit 2a has the shape of a cylindrical shape which prepared the thread groove in the end, and screws with the revolving shaft 10 which has extended from the first motor 2b, and the liquid feed holes 12 for supplying cooling water to bit 2a are formed in the halfway section of this revolving shaft 10. Here, the second motor is attached to first motor 2a, and the control section is installed outside. It fixes by attaching such a keypunch 2 in the stanchion 11 fixed to Wall W (refer to drawing 1).

[0022] The liquid circulation system 1 for keypunches of this operation gestalt is attached and used for a keypunch 2 in case such a keypunch 2 does a punching activity, and it is attached by joining the transparence hose 8 which is the supply way of cooling water to the liquid feed holes 12 of bit 2a through an attaching member 13. Cooling water is supplied from this transparence hose 8.

[0023] Among the hose 9 which are the water receptacle pad 3 and exhaust passage which are a [suspension recovery means] suspension recovery means, the water receptacle pad 3 is formed in box-like so that the surroundings of ***** 14 location of bit 2a of the keypunch 2 fixed with the stanchion 11 may be surrounded, and it is installed in Wall W. That is, when Wall W is seen from a first motor 2b side, bit 2a comes to be inserted in the water receptacle pad 3 of a core box. Thus, it is possible by surrounding the perimeter of bit 2a to collect all the suspension that disperses by the revolution of bit 2a at the time of cut punching.

[0024] Moreover, the hose 9 is connected to exhaust port 3a which discharges the cooling water with which the water receptacle pad 3 was formed caudad, and it has combined with filtration tank 4b in depot 4a installed in the floor F near the wall W (refer to drawing 1).

[0025] The upper part carries out opening and filtration tank 4b which is a part of [suspension filtration means] suspension filtration means has become the body 15 which is the cylinder of the shape of hollow with the slitting 17 of a V character configuration from the lid 16 at the upper bed section which carried out opening, as shown in drawing 2 (b). Slitting 17 serves as a tap hole for flowing out of filtration tank 4b into depot 4a, after the suspension which flowed in filtration tank 4b from the water receptacle pad 3 passes the filter 18 made of a nonwoven fabric which filters cut waste S and serves as cooling water (refer to drawing 2 (a)).

[0026] Moreover, insertion opening for inserting in a lid 16 the hose 9 which opening of the filter 18 formed in saccate is attached [hose] inside removable, and makes suspension flow into an abbreviation center section is prepared. Here, when a body 15 is covered with a lid 16, the head of the hose 9 inserted from insertion opening of a lid 16 is located in the bag of the filter 18 formed in saccate, and let the volume of the saccate filter 18 attached in the lid 16 be a larger thing than the volume of a body 15. In addition, about the volume of the filter 18 formed in saccate, if effectiveness of this invention is not spoiled, it will not be limited especially.

[0027] Where such filtration tank 4b covered the body 15 with the lid 16 and a hose 9 is inserted in insertion opening, it is used, but since it cuts deeply on a body 15 and 17 is prepared, it is possible to make cooling water flow out, cover [filtration tank 4b / with the lid 16]. Moreover, this filtration tank 4b is installed in depot 4a. For this reason, the cooling water which was obtained by filtration and flowed out from slitting 17 will flow in depot 4a, and will be stored.

[0028] Moreover, it has further insertion opening of a hose 9, and the lid 19 which prepared insertion opening of the transparense hose 8 in depot 4a, and is used for it in the condition of having covered with the lid 19. Thus, by covering with a lid 19, mixing of the impurity from the work site to the cooling water in depot 4a is prevented. Here, in this depot 4a, the submersible pump 5 which is a part of coolant supply means to supply cooling water to bit 2a is installed.

[0029] [Coolant supply means] This submersible pump 5 floated, has attached 6, and is formed in the condition of having floated near the water surface m of the cooling water which flowed out of filtration tank 4b in depot 4a. For this reason, a submersible pump 5 will always be located near the water surface m with fluctuation of the upper and lower sides of water surface m height. For this reason, a submersible pump 5 supplies water to bit 2a through the transparense hose 8 in the upper cooling water always stored in depot 4a.

[0030] By using this transparense hose 8, muddiness of cooling water can be checked and water can be certainly supplied to bit 2a in the filtered cooling water. Furthermore, by using the transparense hose 8, when the cooling water to which water is supplied has become muddy, the replacement stage of a filter 18 can be guessed. Although the submersible pump 5 is formed in the condition of floating near the water surface m, with the gestalt of this operation here, it is not limited to this, and if it is possible to supply water to bit 2a in the cooling water in depot 4a, the installation location of a submersible pump 5 will not be asked. For example, a submersible pump 5 can also be formed down [in depot 4a].

[0031] Although water is supplied to the cooling water to which water is supplied from a submersible pump 5 by bit 2a through the transparense hose 8, the abrasive grain of the specified quantity is supplied to it by the abrasive grain feeder 7 installed in the middle of the transparense hose 8. The amount of supply of the abrasive grain at this time is suitably chosen by the path of bit 2a etc.

[0032] Thus, it is possible for ***** 14 of bit 2a to be ground and to recover the sharpness of bit 2a by supplying an abrasive grain to cooling water and rotating the inside of the cooling water with which bit 2a contained the abrasive grain. Thus, a coolant supply means serves as a submersible pump 5 and the transparense hose 8 from the abrasive grain feeder 7.

[0033] Thus, even if it is the case where only little water can be prepared by circulating through and using cooling water, it is possible to supply the cooling water of an amount enough until a punching activity is completed. Thereby, an operator does not need to supply cooling water for lack of cooling water, and the burden of haulage [exhausting / of the physical strength accompanying this makeup activity] of a heavy lift etc. can be lost. Moreover, since suspension is collected and filtered, it is useful also to landscaping maintenance of a work site. Furthermore, even when it is used in the location where water works were ready, since only the water of the amount restricted as cooling water is used, it is possible to hold down the cost of construction.

[0034] In addition, although the nonwoven fabric is used as a filter 18 used for a suspension filtration means in the liquid circulation system 1 for keypunches of this operation gestalt, it is not limited to this, and if cut waste S can be filtered, the construction material of a filter 18 etc. will not be asked.

Moreover, this filter 18 is good also as a mode supported with the basket 20 as shown in drawing 5 other than the mode attached in filtration tank 4b. In such a case, the cooling water which passed the filter 18

flows out of the filter 18 whole in depot 4a.

[0035] Moreover, although the punched object was used as Wall W with the gestalt of this operation, it is possible to use the liquid circulation system 1 for keypunches also in other locations. For example, what is necessary is to install the water receptacle pad 3 in the surroundings of bit 2a, to pump up the suspension which collected in the water receptacle pad 3 with Pump P, and just to lead it in filtration tank 4b, when a punched object is Floor F, as shown in drawing 4. Here, Pump P pumps up intermittently the suspension which collected in the water receptacle pad 3.

[0036] Operating Pump P intermittently has the small liquid feed holes 12 prepared in bit 2a, and it is because the amount of the suspension with which the water receptacle pad 3 is covered is not an amount enough to the amount of pumping of Pump P a result with few circulating water flows supplied to bit 2a. namely, the suspension collected on the water receptacle pad 3 -- enough -- ** -- since a certain suspension with which the water receptacle pad 3 is covered will not be an amount enough although it is satisfactory even if it pumps this up continuously if it becomes, Pump P will also pump up air at the same time it pumps up suspension. Thus, that air goes into Pump P causes failure. For this reason, by pumping up intermittently, in the water receptacle pad 3, suspension pumps up enough at the time of *****, and prevents the inflow of the air into Pump P.

[0037] Thus, the suspension led to filtration tank 4b is supplied to bit 2a as cooling water by the coolant supply means as it was shown above. Thus, no matter a punched object may be what location, if it is possible to lead the suspension collected in the water receptacle pad 3 in filtration tank 4b, it is possible to apply this invention.

[0038] Thus, circulation of the cooling water at the time of carrying out cut punching of the wall W using the liquid circulation system 1 for keypunches constituted is explained below. Beforehand, the cooling water of the specified quantity is stored in depot 4a. Bit 2a which rotated with the first motor 2b punches by moving to shaft orientations toward Wall W side by the second motor. At this time, the cooling water supplied by the submersible pump 5 installed in depot 4a reaches ***** 14 from the feed holes 12 of bit 2a and the revolving shaft 10 currently screwed. The cooling water which reached this ***** 14 has achieved the duty which stimulates cooling of a punching part, the lubricative improvement in ***** 14 and concrete, and blowdown of the cut waste S by punching.

[0039] Cooling water serves as suspension including the cut waste S produced when bit 2a punches Wall W, stops in the water receptacle pad 3 surrounding the surroundings of bit 2a, and gathers caudad with gravity. Since this water receptacle pad 3 has prepared exhaust port 3a caudad from bit 2a, the suspension which gathered caudad is automatically discharged from exhaust port 3a, and flows into filtration tank 4b through the hose 9 which is exhaust passage.

[0040] Here, filtration tank 4b is in the condition that the body 15 is covered with the lid 16, and suspension passes along the hose 9 inserted in the lid 15, and flows in the saccate filter 18 fixed in filtration tank 4b. The suspension which flowed in the filter 18 passes a filter 18, flows out of the slitting 17 of a body 15 in depot 4a, and is once stored. Thus, in case suspension passes a filter 18, the cut waste S in larger suspension than the gap of the fiber of a nonwoven fabric cannot pass a filter 18. For this reason, by making a filter 18 pass suspension, almost all cut waste S can be removed and using as cooling water is possible. In addition, about a filter 18, it is opening the lid 16 of filtration tank 4b, and it is possible to perform easily exchange with the filter which collected cut waste S, and an intact filter.

[0041] The cooling water which passed the filter 18 is once stored in depot 4a. Here, although almost all cut waste S is removed and the cooling water currently stored in this depot 4a is usable as cooling water by passing a filter 18 within filtration tank 4b, cut waste S is not removed thoroughly. The particle is also contained in cut waste S and this is because it is difficult for what can pass a filter 18 to remove cut waste S from suspension thoroughly for a certain reason. For this reason, the detailed cut waste S which still remains in cooling water can be settled at the pars basilaris ossis occipitalis in depot 4a by once storing cooling water in depot 4a.

[0042] Thus, the stored cooling water is supplied to bit 2a by the submersible pump 5 installed in depot 4a. Under the present circumstances, as mentioned above, the submersible pump 5 has floated near the water surface m of cooling water, and a submersible pump 5 will supply water to bit 2a in cooling water

with few impurities, such as cut waste S, than that of the upper part in depot 4a.

[0043] The cooling water to which water was supplied by the submersible pump 5 is again supplied to bit 2a through the transparence hose 8. Here, cooling water is supplied to bit 2a with the abrasive grain supplied by the abrasive grain feeder 7 installed in the middle of the transparence hose 8.

[0044] It explains by making to do a cut punching activity for other gestalten of the liquid circulation system for keypunches concerning this invention on the floor line of concrete next using cooling water into an example, referring to drawing 6 and drawing 7 suitably. In addition, the same member as the configuration explained by drawing 1 thru/or drawing 5 attaches the same sign, and omits explanation.

[0045] As shown in drawing 6, the liquid circulation system 30 for keypunches consists of a keypunch 2 which has bit 2a and the 1st motor 2b, a suspension recovery means and a suspension filtration means, and a coolant supply means.

[0046] The suspension recovery means is constituted so that suspension may be collected from the water receptacle pad 3 through the vacuum (vacuum pump) 33 attached in the depot 32 through the hose (exhaust passage) 9 in the upper part of the depot 32. A vacuum 33 attracts the air in a depot 32 from attraction opening 33a, and it is constituted so that it may discharge through exhaust-port 33b out of a depot 32. And by actuation of the vacuum 33, the atmospheric pressure of a depot 32 is made into negative pressure from atmospheric pressure, and the suspension in the water receptacle pad 3 (and air) is collected in a depot 32.

[0047] Moreover, between a vacuum 33 and the water surface in a depot, the convection-current prevention covering 34 for controlling producing muddiness and convection current of the collected suspension is attached. This convection-current prevention covering 34 is arranged in between fixed distance at the open column number from the location adjacent to the water surface m in a depot 32, or its water surface m. This convection-current prevention covering 34 is equipped also with the duty of covering for suspension not to be attracted by the vacuum 33. In addition, when muddiness or convection current of suspension do not influence the engine performance of circulation and filtration by the capacity of a vacuum 33, and adjustment, it is not necessary to install the convection-current prevention covering 34.

[0048] Furthermore, opening in the filtration tank of a hose 9 is arranged in the saccate filter 18. The filter 18 shut a part for the opening, has attached it near the opening of the hose, and is installed in the interior of the basket 20 which is a support means as shown by drawing 5.

[0049] In addition, in drawing 6, although opening in the filtration tank of a hose 9 is arranged in the condition of having sunk below the water surface m of a depot 32, it is good also as a configuration which is made to carry out opening of the part for opening of a filter 18, and is arranged on the water surface m in the upper part (opening may be arranged above the water surface m in the condition of having arranged in a filter 18).

[0050] An operation of the liquid circulation system 30 for keypunches of a configuration of being shown in drawing 6 is explained. Bit 2a which rotated with the first motor 2b moves to shaft orientations toward a floor line by the second motor (not shown), and does a punching activity. While operating the submersible pump 5 in a depot 32 and supplying cooling water to ***** 14 (refer to drawing 3) at this time, a vacuum 33 is operated and the atmospheric pressure in a depot 32 is made into the condition of negative pressure from atmospheric pressure. If the inside of a depot 32 becomes negative pressure, and cooling water is supplied in the water receptacle putt 3, the suspension with which the cut waste S by punching was mixed will be attracted, and it will be collected in a filter 18 through a hose 9. In case suspension is collected, it is collected the whole air of the water receptacle putt 3. And the collected air is exhausted out of a depot 32 from exhaust-port 33b of a vacuum 33 through the water surface m to the convection-current prevention covering 34.

[0051] The suspension collected in the depot 32 is filtered as drawing 1 thru/or drawing 5 explained, and in a filter 18, cut waste S remains, is removed, and can circulate through it as cooling water again. And the whole liquid circulation system 30 for keypunches can consist of making a vacuum 33 the configuration prepared in a depot and one (to interior) in a compact.

[0052] Moreover, as shown in drawing 7, the depot 42 of the vacuum (vacuum pump) 43 of the liquid

circulation system 40 for keypunches is good also as a configuration arranged in the separated location. That is, the depot 42 is supported so that a filter 18 may be arranged from the water surface m to the upper part side in an upper part location. And the submersible pump 5 is arranged in the filtered water which filtered suspension with the filter 18 of a depot 42.

[0053] Furthermore, more nearly up than the water surface, opening 44a of the attraction hose 44 connected to the vacuum 43 is arranged within the depot 42. This attraction hose has relief valve 44c which floated on the water surface m and has been arranged so that closing motion of opening 44a may be attained through advice member 44b. And the vacuum 43 is constituted so that the air which drew in from the attraction hose 44 to attraction opening 43a may be exhausted from exhaust-port 43b.

[0054] If the liquid circulation system 40 for keypunches constituted like drawing 7 is operated, the suspension and air in the water receptacle putt 3 will be attracted and collected to the filter 18 side of a depot 42 through a hose 9 by making into negative pressure the atmospheric air in the depot 42 attracted by the vacuum 43. The suspension collected in the filter 18 is filtered and collects under the depot 42. And the filtered water of suspension is supplied to the keypunch 2 with the submersible pump 5.

[0055] Thus, the liquid circulation system 40 for keypunches can respond with constituting a vacuum 43 on a depot 42 and another object according to work magnitude cheaply only by changing the capacity of a depot 42.

[0056] In addition, it is convenient when the head of the hose 9 arranged inside depots 56 (4a etc.) is made the configuration which connects the suspension distribution fixture 50 through a splice 51 further, as shown in drawing 8 among each liquid circulation system for keypunches shown by drawing 1 thru/or drawing 7. This suspension distribution fixture 50 is for distributing suspension uniformly to 18 in a filter, and avoiding concentration of the blinding of a filter 18. Moreover, even if it is a metallic material with big mass, and a nonmetal material, since the volume is large, it is also for collecting beforehand weight waste G including both of what has big mass.

[0057] That is, the suspension distribution fixture 50 consists of the tubed body section 52 of the owner bottom formed in the center, and two or more tees 53 attached in the location (a drawing almost middle) of the predetermined height of this tubed body section 52. the stream of the suspension with which the weight waste G with which each tee 53 once flowed into the tubed body section 52 is sent in -- it is attached in the location of extent where it does not soar from a bottom part with the rate. And each tee 53 is formed in the shape of a branch in the condition of having inclined in the shape of [of Ha] a character from the tubed body section 52, and two or more opening 53a is formed inside (tubed body section 52 side). Furthermore, the location of opening 53a is located in the fixed spacing upper part from the bottom part of a tee 53. And each tee 53 is formed in the diameter smaller than the diameter of the tubed body section 52.

[0058] when installing the suspension distribution fixture 50, while changing the bottom part of the tubed body section 52 into the condition of having made the bottom of a depot 52 supporting -- the middle of a filter 18 -- it is considering as the configuration with which it is disc-like in a location and a part attaches the convection-current prevention means 55 of a nylon screen in it. This convection-current prevention means 55 is equipped with the mesh with a nylon screen bigger about (150-170 micrometers) 10 times than FAIRUTA 18. In addition, the depot 56 is constituted so that a filter 18 may be supported by pinching a part for opening of a filter 18 between a lid and a case.

[0059] Below, an operation of the suspension distribution fixture 50 is explained. If suspension is sent from a hose 9 as shown in drawing 8, suspension will be first sent into the tubed body section 52 side, and it will be further sent to a tee 53 side one by one. At this time, even if it is a metallic material with big mass among suspension, and a nonmetal material, weight waste G including both with the big volume collects on the bottom part of the tubed body section 52. And cut waste S, such as a fine chip contained in the suspension sent one by one, is sent out to a filter 18 side from opening 53a of a tee 53. The water which cut waste S filtered the suspension sent out in the filter 18 with the filter 18, it was taken, and was filtered is again supplied as coolant by the submersible pump 5.

[0060] In addition, since the convection-current prevention means 55 is attached in the suspension distribution fixture 50 so that a filter 18 may be divided in the height direction, within a filter 18, among

suspension, the fine cut waste S of a particle passes the nylon screen, is sent to the upper part side of a filter 18, and is filtered with a filter 18 by the convection current produced to some extent. Moreover, the big cut waste S of a particle cannot exceed the convection-current prevention means 55, but the wall surface side of the filter 18 located under the convection-current prevention means 55 will be adsorbed (it filters).

[0061]

[Effect of the Invention] The liquid circulation system for keypunches concerning this invention explained above is attached and used for a keypunch, and they are recovery of cooling water, filtration, and a configuration equipped with a supply means. Therefore, while punching effectiveness can improve little water since [which is the need at the time of a punching activity] it can supply as cooling water of an amount enough, and being able to shorten working hours, risk [exhausting / and / of the physical strength accompanying a drawing-water activity] of being because a heavy lift being carried etc. can mitigate an operator's burden. Moreover, since suspension is collected and filtered, it is utility also at landscaping maintenance of a site. Furthermore, by mixing an abrasive grain in the cooling water to supply, ***** of a bit can be ground, thereby, punching effectiveness can improve more and working hours can be shortened further.

[0062] Moreover, since a vacuum (vacuum pump) does not intervene between the recovery paths of the suspension when a suspension recovery means is equipped with a vacuum pump and it collects suspension, suspension does not pass through the interior of a vacuum (vacuum pump), and degradation of the vacuum pump is not sped up. Moreover, by using a vacuum (vacuum pump), suspension is always stabilized from the location of water receptacle putt, and a suspension filtration means side can be supplied. Furthermore, since especially the configurations of water receptacle putt, and adjustment of the location of a bit and water receptacle putt are not limited by using a vacuum (vacuum pump), it is convenient.

[0063] Furthermore, the liquid circulation system for keypunches can equalize the blinding of a filter by considering as the configuration which has a suspension distribution means, and it becomes possible to raise the activity life of a filter of it. Moreover, since the weight waste contained in suspension is recoverable into the bottom part of the tubed body section, it can prevent early degradation of a filter.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the conceptual diagram showing 1 operation gestalt of the liquid circulation system for keypunches concerning this invention.

[Drawing 2] (a) is the sectional view of the depot and filtration tank which were used for the gestalt of this operation, and a submersible pump, and (b) is the perspective view of a filtration tank.

[Drawing 3] It is the sectional view of the bit at the time of punching.

[Drawing 4] It is the conceptual diagram showing other operation gestalten of the liquid circulation system for keypunches concerning this invention.

[Drawing 5] It is drawing showing the basket which supports a filter.

[Drawing 6] It is the conceptual diagram showing the operation gestalt at the time of using a vacuum pump in the liquid circulation system for keypunches concerning this invention.

[Drawing 7] It is the conceptual diagram showing other operation gestalten at the time of using a vacuum pump in the liquid circulation system for keypunches concerning this invention.

[Drawing 8] It is the sectional view showing the suspension distribution fixture of the liquid circulation system for keypunches concerning this invention.

[Description of Notations]

- 1 ... Liquid circulation system for keypunches
- 2 ... Keypunch
- 2a ... Bit
- 2b ... The first motor
- 3 ... Water receptacle pad
- 3a ... Exhaust port
- 4a ... Depot
- 4b ... Filtration tank
- 5 ... Submersible pump
- 6 ... Float
- 7 ... Abrasive grain feeder
- 8 ... Transparence hose
- 9 ... Hose
- 10 ... Revolving shaft
- 11 ... Stanchion
- 12 ... Liquid feed holes
- 13 ... Attaching member
- 14 ... *****
- 15 ... Body
- 16 ... Lid
- 17 ... Slitting
- 18 ... Filter

19 ... Lid
20 ... Basket
33 43 ... Vacuum (vacuum pump)
50 ... Suspension distribution fixture
52 ... Tubed body section
53 ... Tee
53a ... Opening
55 ... Convection-current prevention means
56 ... Depot
G ... Weight waste
m ... Water surface
P ... Pump
F ... Floor
S ... Cut waste
W ... Wall

[Translation done.]